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RESEARCH ARTICLE

ARE MEDICAL STUDENTS FAMILIAR WITH PATIENT SAFETY CULTURE? A CROSS-SECTIONAL STUDY IN TÜRKIYE

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ABSTRACT

BACKGROUND:

Patient safety is a key indicator of healthcare quality. The purpose of this study is to evaluate the attitudes of medical students towards patient safety culture.

METHODS:

The population of the study, which was designed as descriptive and cross-sectional, consisted of 369 fourth, fifth-, and sixth-year students studying at Karabük University Faculty of Medicine. The sample consisted of 264 students who volunteered to participate in the study. Data were collected using a descriptive information form and the Medical Faculty Students' Attitude Scale Towards Patient Safety Culture. Data were analyzed using descriptive statistics and SPSS.

RESULTS:

Most of the students stated that they did not receive any training regarding patient safety. It was determined that the sub-dimensions with the highest mean scores regarding the patient safety culture attitude of medical faculty students were working hours (87.98(±17.64)) and teamwork (83.74(±13.69)) as the cause of error. It was also found that the lowest mean score was in the sub-dimension (31.33(±22.77)) related to those who saw professional incompetence as the reason for the mistake. In addition, it was found that students had positive attitudes regarding the sub-dimensions of working hours, teamwork, the role of the patient in the error, and the importance of patient safety in the curriculum as reasons for errors.

CONCLUSION:

Providing patient safety culture training to medical students before and during clinical practice, improving physicians' working hours, promoting teamwork, and involving patients in the care process may positively influence students' attitudes toward patient safety culture.

KEYWORDS

patient safety culture, attitude, medical students, medical error, patient safety

INTRODUCTION

Healthcare is one of the most critical sectors in terms of safety due to the life-threatening consequences of errors and system failures. Therefore, patient safety is considered a fundamental component of healthcare quality [1]. The World Health Organization (WHO) defines patient safety as the prevention or minimization of errors and risks associated with healthcare services that impact patients [2]. The WHO states that no one should be harmed while receiving healthcare services, yet there is clear evidence that globally, preventable patient harm is at high levels across both developed and developing country's healthcare systems. It has emphasized that this situation has significant human, moral, ethical, and financial consequences [2]. Among the most common adverse events are patient falls, medication errors, pressure ulcers, nosocomial infections, retained foreign objects, transfusion-related errors, wrong-site surgeries, diagnostic errors, and delays in treatment [3-5]. Medical errors are estimated to be among the most common causes of death in the United States [6].

When evaluating the causes of adverse events, it has been emphasized that there are numerous and interrelated factors that can lead to patient harm. These can be categorized as system and organization-related causes, technology-related factors, human and behavioral factors, patient-related causes, and external elements [2,7-11]. In the WHO Global Patient Safety Action Plan 2021-2030, it is stated that to implement patient safety initiatives comprehensively, efforts should be made to engage key stakeholders globally to reduce preventable harm from unsafe healthcare to the highest possible level and to ensure that all patients everywhere receive safe and respectful care. To achieve this, it is important to adopt effective leadership that prioritizes a culture of patient safety, creates a safe working environment, and ensures the safety of clinical processes. Additionally, it is important to improve communication and teamwork, involve patients and their families in policy development, research, and shared decision-making, and establish reporting systems for patient safety incidents to promote learning and continuous improvement [1].

Establishing a positive patient safety culture is one effective way to prevent adverse events, as it promotes the improvement of safety processes and outcomes. The patient safety culture of an organization is often shaped by senior management. Leaders have the potential to promote a fair and positive patient safety culture in their institutions [3]. All staff members play a critical role in fostering a culture of patient safety. Studies indicate that a positive patient safety culture is associated with fewer errors [12-14]. A positive organizational culture is linked to greater employee engagement in incident reporting, improved patient safety, and reduced mortality rates [15]. Studies conducted in Türkiye indicate that the patient safety culture has not yet been fully established, that there is insufficient reliable data on this issue, that errors harming patients are concealed, and that a large portion of medical errors are preventable [16,17].

Improving patient safety practices requires fundamental cultural change in healthcare. Two key elements of this cultural shift were identified as the early integration of patient safety practices into educational curricula and the provision of safety training for medical residents [18]. Evaluating the attitudes of medical students toward patient safety is considered essential to ensuring a proactive and effective strategy for identifying and preventing medical errors [19]. Studies highlight the importance of integrating undergraduate education that focuses on strategies for preventing medical errors, particularly for soon-to-be graduate physicians [20,21]. A study conducted in Iran to evaluate students' perceptions of patient safety and their knowledge and attitudes towards patient safety education found that only half of the students had a good level of knowledge about patient safety. The study also indicated that significant relationships exist between students' attitudes towards patient safety and their years of study, gender, and education status, and suggested incorporating patient safety into the medical education curriculum [22]. This situation highlights a common gap in pre-graduation programs, which primarily emphasize medical knowledge, technical skills, and clinical decision-making experience, while often neglecting non-technical and professional competencies such as teamwork, leadership, human factors, and risk management. In addition, recent years have seen several accreditation bodies emphasizing the urgent need to prioritize patient safety education for students in the health sciences [23,24].

Today, many medical schools have integrated patient safety education into their curricula [24]. The WHO has developed a reference curriculum for patient safety for medical students. Key topics of this curriculum include: defining patient safety, the importance of human factors in patient safety, the impact of systems and complexity on patient care, the importance of being an effective team player, understanding and learning from errors, understanding and managing clinical risks, knowledge of quality improvement methods, involving patients and caregivers in care and decision-making processes, and the importance of patient safety in interventional procedures, infection control practices, and patient safety [25]. Understanding the patient safety culture is crucial for medical students because it directly affects how they approach patient safety matters in their future practice [26]. In Türkiye, there are limited studies assessing medical students' perceptions of patient safety culture. This study aims to determine the attitudes of fourth, fifth, and sixth year medical students towards patient safety culture and to make recommendations based on the findings. The research questions for this study are as follows:

1. What is the status of medical students' education regarding patient safety?
2. Is there a significant difference between participants' descriptive characteristics and their attitudes towards patient safety culture?
3. Is there a relationship between participants' age and their status of receiving patient safety education with their attitudes towards patient safety culture?
4. Is there a significant relationship among the sub-dimensions of the patient safety culture attitude scale among medical students?

METHODS

POPULATION ND SAMPLE

The study was conducted at Karabük University Faculty of Medicine during the Fall semester of the 2023-2024 academic year, with a population comprised of 369 students: 128 from the fourth year, 149 from the fifth year, and 92 from the sixth year students. The sample included 264 students who volunteered to participate: 91 from the fourth year, 113 from the fifth year, and 48 from the sixth year students (71%, 76%, and 52% of the population respectively). According to calculations using Epi Info 7 statistical software, a sample size of 188 students-65 from the fourth year, 76 from the fifth year, and 47 from the sixth year was deemed sufficient based on a 95% confidence level and a 5% margin of error. However, a larger number of responses were collected, and after excluding 12 surveys as outliers during data analysis, the final sample consisted of 252 students.

The reason for excluding students from the preparatory, first, second, and third years was based on expert opinions from faculty members, who indicated that these students had not yet reached a level of clinical experience and knowledge to provide meaningful input on patient safety.

DATA COLLECTON AND TECHNIQUE

In the study, data were collected through face-to-face interviews using a descriptive information form and the Medical Students' Attitudes Towards Patient Safety Culture Scale. The descriptive information form, prepared by the researchers, consisting of 6 questions, which includes participants' sociodemographic characteristics and whether they have received any education on patient safety during their training. The Medical Students' Attitudes Towards Patient Safety Culture Scale, developed by Carruthers et al. [27], was adapted into Turkish by Torun et al. [28]. The original survey's Cronbach Alpha value was reported as 0.73. The scale, designed on a 5-point Likert type questionnaire, includes nine factors and a total of 24 items as follows: patient safety training received to date (3 items), error ınevitability (3 items), error reporting confidence (3 items), professional ıncompetence as error cause (3 items), team functioning (2 items), working hours as error cause (3 items), patient's role in error (2 items), ımportance of patient safety in the curriculum (2 items), and disclosure responsibility (3 items). The possible total score ranges from 24 to 120, with higher scores indicating a more positive attitude. To standardize the total and subscale scores on a 0–100 scale, the following formula can be used:

New Score = (Score - Minimum) × 100 / (Maximum - Minimum). The data collection period was from October 15 to December 31, 2023.

INCLUSION CRITERIA

- Enrolled at Karabük University Faculty of Medicine
- A fourth, fifth, or sixth year medical student
- Willingness to participate in the study

DATA ANALYSIS

In the study, descriptive statistics and the statistical programs R and Epi Info 7 were used to analyze the research data obtained from the survey application. Categorical data were presented as counts and percentages, while numerical data were analyzed using the mean ± standard deviation (Mean ± SD), depending on the normality of the distribution. The overall reliability coefficient of the scale, measured by Cronbach's Alpha, is provided in Table 2. Prior to the data analysis, outlier analysis was conducted using a Q-Q Plot to assess the normality of the data distribution, and 12 surveys with outliers were excluded from the study.

Before analyzing the data obtained in the study, normality of distribution was assessed based on skewness and kurtosis coefficients, as well as Q-Q Plots and histogram graphs. Skewness and kurtosis coefficients were calculated by dividing the Statistic value by the Std error value, with coefficients expected to fall within the ±2.58 range at a 99% confidence interval [29]. Accordingly, the skewness and kurtosis values for the sub-dimensions of the scale were seen Table 1.

TABLE 1. THE SKEWNESS AND KURTOSIS VALUES FOR THE SUB-DIMENSIONS OF THE SCALE

Sub-Dimension	Skewness	Kurtosis
Patient Safety Training Received to Date	-0.531	0.177
Error Reporting Confidence	-0.688	0.180
Working Hours as Error Cause	-0.843	0.564
Error Inevitability	-0.419	0.297
Professional Incompetence as Error Cause	0.522	0.139
Disclosure Responsibility	0.533	0.971
Team Functioning	-0.855	0.268
Patient's Role in Error	-0.795	0.028
Importance of Patient Safety in the Curriculum	-0.630	0.562

These values indicate that the data followed a normal distribution. Statistical significance was considered at $p<0.05$. The relationships between measurement variables were assessed using Pearson correlation tests, independent two-group comparisons were conducted using the t-test, and comparisons among three or more groups were performed using Analysis of Variance (One-Way ANOVA). Tukey post-hoc tests were used to identify the sources of differences among groups.

CONFIDENTIALITY AND ETHICAL ISSUES

Ethical approval for the study was obtained from the Ethics Committee for Non-Interventional Research at Bandırma Onyedi Eylül University Health Sciences (date: September 20, 2023; number: 2023-7/125). Written permission was also obtained from the Rectorate of the university where the study was conducted (date: October 9, 2023; number: 282483/E-78436549-730.08.03-284697). Permission for the scale used in the study was acquired via email. Written informed consent was obtained from the participants after they were provided with information about the study. All research-related

information was kept confidential, and participants had the right to withdraw from the study at any point during the research process.

RESULTS

This study investigates the current state of patient safety education among medical students and its relationship with their attitudes toward patient safety culture. It also examines potential differences based on participants' demographic characteristics and explores correlations among the sub-dimensions of the Patient Safety Culture Attitude Scale.

Table 2 presents the distribution of students' scores by age and scale sub-dimensions, as well as the Cronbach's alpha values. The average age of the study participants was 23.08 (±1.55). When examining the score distribution of scale sub-dimensions, it was found that the lowest average score (31.33 ± 22.77) was related to perceptions of professional incompetence as error cause, while the highest average scores were attributed to perceptions of working hours as error cause (87.98 ± 17.64) and teamwork-related sub-dimension (83.74 ± 13.69). In the study, students were found to have a positive attitude towards the four dimensions of the patient safety culture scale: "working hours as error cause", "team functioning", "patient's role in error", and "importance of patient safety in the curriculum".

TABLE 2. SCORE AND CRONBACH ALPHA DISTRIBUTION OF PARTICIPANTS ON AGE AND SCALE SUB-DIMENSIONS

Variable	x±SS	Min./Max.	Cronbach alpha
Age	23.08±1.55	21-29	
Patient Safety Training Received to Date	59.47±23.50	0-100	0.836
Error Reporting Confidence	66.78±24.13	0-100	0.859
Working Hours as Error Cause	87.98±17.64	0-100	0.777
Error Inevitability	59.84±13.69	8-100	0.752
Professional Incompetence as Error Cause	31.33±22.77	0-100	0.815
Disclosure Responsibility	45.27±16.63	0-100	0.717
Team Functioning	83.74±19.21	0-100	0.877
Patient's Role in Error	79.42±20.23	0-100	0.780
Importance of Patient Safety in the Curriculum	81.07±20.48	0-100	0.907

The sociodemographic characteristics of the participants and their responses to statements regarding patient safety are shown in Table 3. It was found that 57.5% of the participants were female, 98.9% were single, and 44.8% were fourth-year students. 77.4% of the students stated that they had not previously attended any training on patient safety within the scope of the course, and 85.3% stated that they did not receive any training on patient safety at the institution where they did their internship period.

TABLE 3. DISTRIBUTION OF PARTICIPANTS' SOCIODEMOGRAPHIC CHARACTERISTICS AND RESPONSES TO STATEMENTS REGARDING PATIENT SAFETY

Variable		Frequancy	Percentage
Gender	Female	145	57.5
	Male	107	42.5
Marrital status	Married	3	1.2
	Single	249	98.8
Family income	Income is less than expenses	26	10.3
	Income equal to expenses	132	52.4

	Income exceeding expenses	94	37.3
Year	4	91	36.1
	5	113	44.8
	6	48	19.0
Previously receiving any training on patient safety within the scope of the course	Yes	57	22.6
	No	195	77.4
Previously attending any training on patient safety at the hospital where they completed their internship	Yes	37	14.7
	No	215	85.3
Information about the Ministry of Health's training programs regarding patient safety	Yes	38	15.1
	No	214	84.9
Total		252	100.0

Comparison of the participants' variables and scale sub-dimensions' mean scores is given in Table 4. A statistically significant difference was found in the scale sub-dimension of "working hours as error cause" based on gender, with female scoring higher on average compared to male ($p<0.05$). Participants who received patient safety training within the course previously were found to have higher scores in "patient safety training received to date," "error reporting confidence," and "team functioning" compared to those who did not receive such training. Additionally, statistically significant differences were found among participants' years in the sub-dimensions of "patient safety training received to date," "error reporting confidence," "working hours as error cause," and "ımportance of patient safety in the curriculum" ($p<0.05$). In the post hoc (Tukey) test, differences were observed between the 5th and 6th year in the sub-dimensions of "patient safety training received to date" and "error reporting confidence," with the 5th grades scoring higher on average compared to the 6th year. Additionally, differences were found between the 4th and 6th year in the "working hours as error cause" sub-dimension, with the 6th-year showing a higher average score. Lastly, in the sub-dimension of "importance of patient safety in the curriculum," the average score of 6th-year students was higher compared to 4th and 5th year. Participants who had previously attended any training on patient safety during their internship period showed statistically significant differences in the sub-dimensions of "patient safety training received to date" and " error reporting confidence" compared to those who did not attend such training ($p<0.05$) (Table 4).

TABLE 4. COMPARISON OF STUDENTS' DESCRIPTIVE CHARACTERISTICS AND SCALE SUB-DIMENSION SCORES

Variable			Patient Safety Training Received to Date	Error Reporting Confidence	Working Hours as Error Cause	Error Inevitability	Professional Incompetence as Error Cause	Disclosure Responsibility	Team Functioning	Patient's Role in Error	Importance of Patient Safety in the Curriculum
		n	Mean±SD	Mean ±SD	Mean ±SD	Mean ±SD	Mean ±SD	Mean ±SD	Mean ±SD	Mean ±SD	Mean ±SD
Gender	Female	145	61.13± 21.12	67.33± 22.97	90.06± 14.92	59.37± 14.49	29.37± 21.85	44.55± 15.39	84.89± 18.29	80.26± 20.04	82.82± 18.37
	Male	107	57.22± 26.33	66.03± 25.71	85.14± 20.51	60.49± 12.57	33.99± 23.81	46.25± 18.20	82.18± 20.37	78.28± 20.53	78.71± 22.92
	t		1.266	0.422	2.104	0.560	1.596	0.802	1.107	0.767	1.582
	p[a]		0.207	0.673	**0.037***	0.512	0.112	0.423	0.269	0.444	0.115
Year	4	91	58.75± 21.0	66.35± 20.99	85.54± 19.96	60.49± 12.17	31.59± 22.10	45.64± 17.34	82.48± 18.02	78.80± 17.71	78.23± 21.32
	5	113	63.13± 21.12	70.70± 21.40	87.57± 17.68	59.81± 12.30	32.77± 22.09	45.23± 15.12	83.13± 20.21	79.33± 20.47	79.41± 21.40
	6	48	52.22± 30.86	58.37± 32.63	93.54± 10.54	58.70± 18.85	27.43± 25.51	44.64± 18.85	87.58± 18.87	80.83± 24.19	90.39± 12.94

	f		3.772	85.54	3.338	0.266	0.935	0.057	1.213	0.159	6.487
	p[b]		**0.024 (5>6)***	**0.012 (5>6)***	**0.037 (6>4)***	0.766	0.394	0.945	0.299	0.853	**0.002 (6>4-6>5)***
Previously receiving any training on patient safety within the scope of the course	Evet	57	67.36± 21.901	73.61± 19.81	88.29± 18.78	57.47± 14.09	29.38± 20.16	43.50± 14.59	87.75± 14.65	81.71± 19.18	81.21± 20.42
	Hayır	195	57.19±23.51	64.78± 24.95	87.88± 17.34	60.54± 13.53	31.90± 23.50	45.78± 17.18	82.57± 20.23	78.75± 20.53	81.04± 20.55
	t		2.924	2.452	0.154	1.492	0.733	0.910	2.138	0.971	0.055
	p[a]		**0.004***	**0.015***	0.877	0.137	0.464	0.363	**0.034***	0.332	0.956
Previously attending any training on patient safety at the hospital where they completed their internship	Evet	37	69.81± 26.09	80.13± 17.94	86.97± 17.05	60.00± 11.01	30.43± 24.92	0.795± 14.53	87.18± 16.51	85.21± 17.87	80.48± 23.79
	Hayır	215	57.69± 22.62	64.48± 24.35	88.15± 17.78	59.82± 14.13	31.48± 22.44	45.78± 16.94	83.15± 19.61	78.43± 20.49	81.18± 19.92
	t		2.939	3.735	0.375	0.072	0.260	1.179	1.181	1.893	0.190
	p[a]		**0.004***	**0.000***	0.708	0.942	0.795	0.239	0.239	0.060	0.849

[a]Independent groups T test, [b]Oneway ANOVA test, SD: Standart Deviation, *p<0.05

The relationships between participants' variables and scale sub-dimensions are shown in Table 5. A weak positive correlation was found between the age of the students and the sub-dimensions of "professional incompetence as error cause" and "disclosure responsibility" (p<0.05). It was observed that as age increased, the scores of both sub-dimensions also increased. As the average score of "patient safety training received to date" sub-dimension increases, the scores of "comfort with reporting errors," "perceptions of working hours as a cause of error," "teamwork," and "role of the patient in errors" sub-dimensions also increase. As the average scores of the "working hours as error cause" sub-dimension increase, the scores of the "error inevitability," "team functioning," "patient's role in error," and "importance of patient safety in the curriculum" sub-dimensions have increased. However, the scores of the "professional incompetence as error cause" and "disclosure responsibility" sub-dimensions have decreased in the opposite direction.

TABLE 5. RELATIONSHIP STATUS BETWEEN VARIABLES AND SCALE SUB-DIMENSIONS

Variable and Sub-dimentions		Previously receiving any training on patient safety within the scope of the course	Error Reporting Confidence	Working Hours as Error Cause	Error Inevitability	Professional Incompetence as Error Cause	Disclosure Responsibility	Team Functioning	Patient's Role in Error	Importance of Patient Safety in the Curriculum
Age	r	-0.098	-0.116	-0.082	-0.092	0.143	0.129	-0.037	-0.106	-0.084
	p	0.122	0.066	0.193	0.143	**0.023**	**0.040**	0.564	0.093	0.186
	n	252	252	252	252	252	252	252	252	252
	r		0.520	0.164	0.057	-0.090	-0.069	0.152	0.156	0.103

Previously receiving any training on patient safety within the scope of the course	p		**0.000**	**0.009**	0.370	0.154	0.272	**0.016**	**0.013**	0.102
	n		252	252	252	252	252	252	252	252
Error Reporting Confidence	r			0.196	0.098	-0.244	-0.101	0.292	0.225	0.192
	p			**0.002**	0.120	**0.000**	0.110	**0.000**	**0.000**	**0.002**
	n			252	252	252	252	252	252	252
Working Hours as Error Cause	r				0.218	-0.239	-0.224	0.386	0.291	0.372
	p				**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	n				252	252	252	252	252	252
Error Inevitability	r					0.035	-0.029	0.193	0.066	0.168
	p					0.577	0.642	**0.002**	0.294	0.007
	n					252	252	252	252	252
Professional Incompetence as Error Cause	r						0.192	-0.244	-0.257	-0.194
	p						**0.002**	**0.000**	**0.000**	**0.002**
	n						252	252	252	252
Disclosure Responsibility	r							-0.051	-0.224	-0.141
	p							0.424	**0.000**	**0.026**
	n							252	252	252
Team Functioning	r								0.552	0.599
	p								**0.000**	**0.000**
	n								252	252
Patient's Role in Error	r									0.497
	p									**0.000**
	n									252

**Correlation is significant at the 0.01 level (2-tailed)

*Correlation is significant at the 0.05 level (2-tailed)

DISCUSSION

Patient safety is a fundamental healthcare goal, and medical undergraduates need to acquire the abilities necessary to minimise harm to patients throughout their future practice [26]. In this study, conducted to determine the attitudes of medical students toward patient safety culture, 77.4% of the students reported that they had not received any education on patient safety as part of their coursework, and 85.3% stated that they had not received any training on patient safety during their internship or clinical rotation period at the hospital where they were training. In addition, the comfort in reporting errors and teamwork scores of those who had previously received patient safety training as part of their coursework or during their internship were found to be higher than those who did not receive training. Studies show that the patient safety attitudes of students who receive patient safety training are positively impacted [24,30,31]. Recent studies suggest that interprofessional patient safety education can improve students' knowledge, attitudes, and behaviors related to patient safety. However, there's still limited evidence that these educational gains directly translate into measurable improvements in clinical outcomes [32,33].

In the study, it was determined that the sub-dimensions with the highest mean scores regarding the patient safety culture attitudes of medical faculty students were the "working hours as a cause of error" and "teamwork" sub-dimensions. Studies conducted in Jordan, Pakistan, China, and Malaysia found that students gave the highest scores to these two sub-dimensions [23,26,34,35]. Similarly, research from Hong Kong, Tunisia, and Singapore identified the "working hours as a cause of error" sub-dimension as the one most highly rated by students [36,37]. Long working hours have been found to be a significant risk factor for burnout among residents, which in turn is a major cause of medical errors [38,39]. A systematic review and meta-analysis aimed at examining the relationship between long working hours and accidents and injuries

found that working more than 55 hours per week is associated with an increased risk of adverse events [40]. These findings emphasize the importance of improving working hours and providing breaks for physicians in Türkiye, who work under intense schedules, to enhance patient safety practices and reduce the risk of errors. In addition, it has been stated that effective planning and promoting work-life balance are important to reduce the risks associated with long working hours [23]. Similarly, students think that effective multidisciplinary teamwork and teaching the principles of teamwork can prevent medical errors. It is important to recognize that effective collaboration and communication can prevent errors and improve patient outcomes. The literature findings support the study results [23,36,37,41,42]. One of the main reasons why students value teamwork is their belief that collaboration across different disciplines is essential for delivering quality healthcare within the complex and multidisciplinary structure of the healthcare sector. Additionally, students feel the need for support and guidance during their clinical training to make accurate decisions regarding patient care.

In the study, it was determined that females had a higher average score than males regarding working hours as a reason for errors. Similar study results can be found [23,43]. The reason for this could be that women, due to assuming different roles in their daily lives, may be more sensitive to long working hours in terms of time management.

Student age was weakly and positively correlated with the "professional incompetence as error cause" and "disclosure responsibility" sub-dimensions, and this correlation was statistically significant. A significant difference was found between students' year of study and the sub-dimensions of "professional incompetence as an error cause" and "disclosure responsibility", with scores increasing as the year of study advanced [35]. This result may suggest that, as clinical experience increases, students are more likely to evaluate error causes from a system-based perspective and develop a greater sense of responsibility for error disclosure. Contrary to the findings of the present study, a multicenter cross-sectional investigation in Jordan found no significant differences between pre-clinical and clinical medical students in terms of their perceptions of professional incompetence as an error cause and disclosure responsibility [23]. In another study conducted by Koleilat et al. [44], no significant differences were found among students' age groups regarding the sub-dimensions of "professional incompetence as an error cause" and "disclosure responsibility".

The study shows that students have a positive attitude towards the sub-dimensions of the "patient's role in errors" and the "importance of patient safety in the curriculum". In deciding on the desired level of positive attitude in a field, Nordén-Hägg et al. [43] suggested a stringent cutoff point such as ≥75 out of 100. In a multicenter cross-sectional study conducted to evaluate the attitudes of medical school students in Jordan towards patient safety, it was found that the students exhibited a positive attitude towards patient safety and that they were positive about the principles and practices supporting patient safety [23]. In a study conducted on senior medical faculty students in Pakistan, it was similarly found that students had a positive attitude towards patient safety practices [34]. In addition, most students expressed that it is crucial to prioritize patient safety education within the medical school curriculum, emphasizing that this education should extend beyond the classroom to clinical settings. They believe that learning about patient safety issues will contribute to their development as more experienced physicians. Studies have shown that medical school students know that including patient safety competencies in the medical curriculum is vital in providing high-quality care and minimizing harm to patients, similar to the study findings [23,34,35]. Contrary to the study findings, a study conducted in China found that more senior students had less positive perceptions of the importance of patient safety in the curriculum [26].

There is a significant negative correlation between "professional incompetence as error cause" and "error reporting confidence" ($r = -0.244$, $p = 0.000$). This indicates that as the perception of professional incompetence as a cause of errors increases, students' confidence in reporting errors significantly decreases. In other words, students who perceive themselves or their colleagues as professionally incompetent tend to have lower confidence in reporting errors. Sullivan et al. [45] found that medical students experience difficulties in reporting professional incompetence, and that their reluctance to report colleagues' professionalism violations is influenced by the curriculum and clinical environment. Lee et al. [46] reported that medical students exhibit lower willingness to disclose their errors and predominantly attribute error reporting to human factors, such as fatigue and inadequate training, as primary root causes. Swinfen et al. [47] reported that medical students have low confidence in error reporting due to a lack of experience and insufficient role models in the clinical environment.

A positive and significant correlation was found between "error reporting confidence" and "team functioning" (r = 0.292, p = 0.000). This indicates that when team functioning is perceived more positively, students' confidence in reporting errors also increases significantly. Studies show that teamwork positively impacts error reporting behavior [48-50]. Heier et al. [51] found significant improvements in interdisciplinary error communication skills and perceptions of team functioning among medical students following a training program aimed at enhancing interdisciplinary communication skills. A study examining the relationship between teamwork perception and clinical error reporting among nurses in two teaching hospitals in Korea found that nurses with higher team communication scores were more likely to report clinical errors to their managers and the patient safety department [52]. In a study evaluating medical students' attitudes towards patient safety in Jordan, it was reported that while students scored highly in the area of team functioning, they received lower scores in reporting error causes, such as professional incompetence [23].

The results of our study indicate that as medical students' scores on the subdimension of perceived importance of patient safety in the curriculum increase, their confidence in reporting errors also tends to increase, revealing a weak but positive correlation between these two variables. Alser et al. [41] found that medical students who received structured patient safety education as part of the curriculum exhibited more positive attitudes toward patient safety culture, although they remained neutral regarding their confidence in reporting errors. Mohsin et al. (19) found that a structured educational program for medical students could enhance their confidence in reporting errors. A systematic review revealed that the integration of patient safety education into medical school curricula has positive effects on students' knowledge, attitudes, and skills. However, it emphasized the need for more structured and hands-on training to improve error reporting behaviors [24].

This study is limited to data collected from voluntary participation of fourth, fifth, and sixth year medical students enrolled at Karabük University Faculty of Medicine during the fall semester of 2023-2024. from October 15th to December 31st, 2023.

CONCLUSION AND RECOMMENDATION

The results of this study indicate that few medical students receive training on patient safety, yet those who do demonstrate more positive attitudes toward a safety culture. This finding highlights the need for systematic educational interventions. Students believe that improving working hours, strengthening teamwork, involving patients in care, and integrating patient safety education into the curriculum are essential steps toward enhancing patient safety culture. To address these needs, it is recommended that medical school curricula be revised to include mandatory patient safety courses. These should be supported not only theoretically but also through clinical practice. Additionally, training faculty members in this area would enhance the practical relevance of the study.

Integrating patient safety education into the curriculum can help cultivate future physicians who are more sensitive to safety issues, less fearful of admitting mistakes, and more committed to transparency. It may also promote interdisciplinary collaboration, align medical education with global standards, and improve public trust in the healthcare system.
This study contributes foundational knowledge regarding the importance of patient safety education in a state university setting and can inform future research aiming to enhance safety culture among medical students. However, since the findings are based on self-reported data, future studies should explore students' actual behaviors and the effectiveness of educational interventions in shaping those behaviors. Particularly, multicenter and longitudinal studies are recommended to assess changes in students' attitudes over time.

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